

Apex House Commercial Unit Energy Strategy.

1. Introduction

The redevelopment of the Apex House site, in Seven Sisters, Haringey, London was completed in summer 2021. The project consists of 159 residential apartments, 4 No. townhouses, resident amenity spaces, and a ground floor commercial space.

The development was constructed in accordance with the Energy Strategy (Energy Strategy Rev 02 dated September 2015) submitted as part of the planning application; inline with the planning conditions.

It is the intention that the ground floor commercial unit will now be fitted out to provide a health & fitness exercise gym.

This note has been prepared to demonstrate how the proposed servicing strategy for the gym has been developed inline with current regulations and how it also targets the latest low carbon design principles that are now common in 2023 in order to deliver a decarbonised solution for the operation of the space.

2. Original energy strategy

The energy strategy for the development was developed inline with current Building Regulations (Part L 2013), Haringey Core Strategy and the London Plan Policy that were current at the time.

The development benefits from a central plant installation consisting of modular high efficiency natural gas fired boilers that operate in conjunction with a natural gas fired Combined Heat & Power (CHP) unit.

Within the energy strategy, it was proposed the commercial unit would be provided with Low Temperature Hot Water (LTHW) from the central energy centre. The infrastructure has been constructed on this basis with pipework routed to the commercial unit demise.

Extract from the project Energy Strategy (dated September 2015):

"This energy strategy has been developed in line with the Energy Hierarchy described in Policy 5.2 of the London Plan of "Be Lean", "Be Clean", and "Be Green" stages to reduce the energy consumption of the development. Low carbon technology, energy-efficient equipment, and passive design will be incorporated into the scheme.

The energy strategy has addressed the key elements of The London Borough of Haringey's Core Strategy on energy and will make a positive contribution to reducing the Boroughs CO2 emissions.

The overall predicted reduction in CO2 emissions from the Baseline development model (which is Part L 2013 compliant) is approximately 28% which represents an annual saving of approximately 62 tonnes of CO2."

3. Carbon Emission factors

At the time of the energy strategy being developed and submitted, the following carbon emission factors were in place for natural gas and grid electricity:

Natural Gas – 0.22kg/kWh

Grid Electricity – 0.52kg/kWh

The national grid has undergone significant decarbonisation in recent years. Current carbon factors in January 2023, as set out in Part L 2021 (SAP 10.2) are as follows:

Natural Gas – 0.210kg/kWh

Grid Electricity – 0.136kg/kWh

As can be seen between the 2 sets of figures, the carbon intensity of natural gas has remained almost identical, however the carbon intensity of grid electricity has significantly reduced and is forecast to continue decreasing in the coming years.

4. Proposed Amendments & Changes

The commercial unit fit out proposed servicing strategy has been developed to minimise primary energy consumption and maximise the achievable reductions in carbon dioxide emissions.

It is proposed that a VRF heat pump system will be provided to deliver the space heating requirements. This will allow the space to benefit from the high Seasonal Energy Efficiency Ratio (SEER) that a heat pump operates at, while also benefiting from the low carbon content of grid electricity (relative to natural gas),

The connection from the central infrastructure will be utilised for the generation of domestic hot water via local hot water calorifiers; aligned with the intent of the original energy strategy.

5. Carbon dioxide emission assessment

1kWh_t from the energy centre, generated by 90% efficient gas boiler plant, has a primary energy consumption of 1.1kWh of natural gas. The associated carbon emissions utilising SAP 10.2 carbon factor is 0.231kgCO₂.

1kWh_t from the energy centre, generated by 40% (thermal) efficient CHP plant, has a primary energy consumption of 2.5kWh of natural gas. The associated carbon emissions utilising SAP 10.2 carbon factor is 0.525kgCO₂.

1kWh_t from a VRF system, generated from a heat pump with a SEER of 3.5 has a primary energy consumption of 0.286kWh of grid electricity. The associated carbon emissions utilising SAP 10.2 carbon factor is 0.039kgCO₂.

As outlined above, the proposed solution will have significantly lower primary energy consumption and associated carbon dioxide emissions when compared to utilising the existing gas driven plant to meet the space heating demands of the space.

6. Cooling Hierarchy

The London Plan “Overheating and Cooling” states that major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the cooling hierarchy. This policy seeks to reduce the impact of the urban heat island effect.

Below are the steps of the hierarchy and the proposals to demonstrate compliance:

1. Minimise internal heat generation through energy efficient design.

• Heat generation will be minimised through the specification of energy efficient ventilation systems, insulation on pipework and low energy lighting.

2. Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls.

- The amount of heat entering the building will be reduced by:
 - o Energy efficient facades with appropriate proportions of glazing;
 - o External shading provided by balconies & solar shading canopies above the windows;
 - o A glazing shading coefficient carefully selected to minimise solar gain in the summer, but also to maximise solar gain in winter.

3. Manage the heat within the building through exposed internal thermal mass and high ceilings.

- Ceiling height in the commercial unit has been maximised within the constraints of the overall building heights and massing.

4. Passive Ventilation

- This will not be implemented to the ground floor commercial unit due to noise, air quality & security considerations.

5. Mechanical Ventilation

- The current ventilation strategy is for the space to be provided with a supply of outside air. The unit will incorporate heat recovery and a by-pass to allow reduction of incoming supply air temperatures where conditions permit.

6. Active Cooling Systems

Due to the nature of the fit out (a gym) comfort cooling is proposed in order to maintain a suitable / comfortable / safe internal environment for exercise to be undertaken.

7. Summary

Through utilising current available high efficiency heat pump technology, in conjunction with the current (and future trending) carbon emission factors for grid electricity, it can be seen that utilising a VRF heat pump for the space heating demands of the commercial unit will consume less primary energy, generating significantly less carbon dioxide emissions than if the gas fired plant were to be used for this purpose.

The proposed heat pumps will utilise 74% less primary energy than gas boiler plant for every kWh of space heating required.

The proposed heat pumps will generate 83% less carbon dioxide emissions than gas boiler plant for every kWh of space heating required.

On the basis of the above, the proposal is therefore to use heat pumps in lieu of the gas fired plant to provide the heating requirements of the commercial unit whilst maintaining the gas fired plant to meet the domestic hot water needs of the commercial unit.